December 21, 1981
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TO: City Council

THROUGH: James L. Brimeyer

FROM: Richard L. Koppy

SUBJECT: Summary of the Hickok Groundwater Contamination Report

INTRODUCTION

The 1980 State Legislature appropriated $125,000 for a study which would further define the contamination of groundwater and soils by coal-tar waste from the former Reilly Tar and Chemical Company's plant site on the Oak Park Village property. In May of 1980 the State of Minnesota, through the Minnesota Department of Health, retained a consortium of consultants including E.A. Hickok and Associates; Geraghty and Miller; and Henningson, Durham and Richardson to work on a study to conceptualize a solution to the contamination problem. The study involves the data from the 1978 through 1980 United States Geological Survey study with a closer examination of the cost-effectiveness of contamination abatement alternatives. The basic objectives for the study were to assess the feasibility of controlling movement of contaminated groundwater by pumping from wells, excavating contaminated soils, and treating and disposing of the waste products. The final study document was received by City staff during December of 1981.

This staff report contains a summary and analysis of the Hickok Report. City Council members are asked to study this summary. A follow-up report containing specific strategy recommendations will be submitted to the City Council for its consideration on January 4, 1982.

RESULTS AND RECOMMENDATIONS OF THE HICKOK REPORT

Study results by the consultant conclude that polynuclear aromatic hydrocarbons (PAH) are present in St. Louis Park groundwater in all the aquifers between the surficial Drift aquifer and the Ironton-Galesville aquifer (see attached Figure 1). The concentrations of the PAH compounds exceed the recommended limits of the Environmental Protection Agency (i.e., 2.8 parts per trillion for carcinogenic PAHs, 28.0 parts per trillion for noncarcinogenic PAHs) in more than one of the aquifers. It is important to mention that at present there are no official standards, on either the state or federal level, for PAH compounds in municipal water supplies. In fact, although hundreds of PAH compounds are known, less than 20 specific PAH compounds have been studied. Only one compound, benzo(a)pyrene, has been determined to be a potent carcinogen. This compound has not been found in the City water supply except in a few unique cases. The consultant has reviewed the available literature on PAH compounds and proposed criteria for the standards.

Despite the implementation of remedial measures, sorption and leakage from the areas of high contamination into the aquifers will probably cause PAH compounds to exist in the shallow aquifers for a number of years. Even with remedial measures, the Prairie Du Chien-Jordan aquifer will probably exhibit significant PAH contamination for at least a century. If groundwater movement is not controlled in the Prairie Du Chien-Jordan and shallower aquifers, the lack of containment will ultimately preclude future potable use (without treatment) of groundwater in areas between the Mississippi River and the City of St. Louis Park.

Effective control of groundwater contamination will require gradient control wells in all of the aquifers with the exception of the Mt. Simon-Hinckley. The consultant concludes that an effective gradient control well system is feasible, including the ultimate disposition of the water from the wells. Treatment and utilization of the water for drinking purposes would remedy the present water supply shortage for the City. Additional work must be conducted on the treatment methodology for the gradient control system. However, granular activated carbon appears to be the best available method for PAH removal at this time. Based on the consultant's prediction of contaminant levels over time, it appears the gradient control well system will need to operate for an indefinite period. Monitoring of groundwater conditions and flexibility in the system design will be important considerations relative to future changes in groundwater withdrawal.

South of the former Republic Creosote site between Walker Street and West Lake Street near Louisiana Avenue there appears to be a significant peat deposit and a distinct "source" zone which act as continuing sources of groundwater contamination. Considerable study must be done on the contaminants in this area to define the specific boundaries and characteristics of the mass. Disposal of these materials removed by excavation or pumping would probably entail truck or rail transport to a hazardous waste dump. The consultant has concluded that the "source" fluid zone should be capped with a low-permeable material to reduce vertical groundwater through the soils from the storm water run-off. (Attached Figure 2 shows area of soil contamination)

Information deficiencies were quantified by the consultant in many areas. Principally, more data are needed on the following subjects:

1. Reliable methods for quantifying PAH compounds at low concentrations;

2. Additional data on PAH concentrations in all of the aquifers;

3. A treatment methodology for the waste materials must be developed,

4. More detailed information must be found on the quantity and quality of the "source" materials and resulting disposal techniques;

5. More work must be done on setting standards for PAH compounds (this is certainly the single most important deficiency).

The Hickok Report concludes that containment of the contamination plume (water mass) should be a first priority. Several immediate actions and ultimate solutions were recommended in the study. Each of the recommendations is listed below with the associated cost estimates and the City staff analysis.

Immediate Actions

1. St. Louis Park Municipal Wells 4, 10, and 15 in the Prairie Du Chien-Jordan aquifer should be returned to service as soon as possible with discharge of the water to the sanitary sewer system.

1982 Cost Estimate $750,000 Annual Operational Cost

Staff Analysis: Hickok and Associates believes that these three wells should be returned to service as soon as possible to contain the movement of contaminants in the St. Louis Park area within the Prairie Du Chien-Jordan aquifer. It is known that the well closures in St. Louis Park have caused the plume to spread outward from the contamination site. Operation of currently closed wells should retard the spread of contamination. The operational costs for this immediate action is high primarily because of the high Metropolitan Waste Control Commission Service Adjustment Charge and treatment costs.

As soon as an acceptable treatment plan is available for the wells, the water can be used for potable purposes. Otherwise, piping should be placed in the ground to the Mississippi River allowing the well effluent to be directly discharged. Economically, the annual cost is exhorbitant, but realistically, containment of the contamination by operating the closed wells is possible based on past experience. With the ultimate gradient control well and treatment system several years from implementation, this plan may be a short-term possibility.

2. The "source" peat deposits should be capped with low-permeable material and graded to maximize surface run-off as an interim measure.

1982 Cost Estimate $1,500,000

Staff Analysis: This action leaves the contaminated soil between Walker Street and West Lake Street in place and covers the contaminated area with an impermeable cap. The cap serves to minimize infiltration of precipitation through the soils. Reduction of vertical groundwater movement would occur, however, horizontal groundwater movement would remain. It has been suggested by others that the horizontal ground movement vector is twice that of the vertical groundwater movement vector. The consultant admits that capping is not a complete, long-term solution for the contaminated soils, but feels it is a worthwhile short-term measure. No cost-benefit information has been included in the report for the soil-capping alternative. Additionally, the data deficiency gap in soils management is large. Therefore, it appears the capping alternative is premature and incomplete. Possibly, a complete containment plan of the hazardous "source" materials should be an ultimate goal, considering the liabilities of excavation.

3. The City of St. Louis Park should continue to investigate alternative water sources.

1982 Cost Estimate ? ? ?

Staff Analysis: With the new addition of a Hinckley well and the interconnection with the City of Plymouth, the City is taking proper precautions. It may be some time before the State studies result in physical remedial measures. Necessarily, in order to assure the City residents of drinking water, the City must continue to pursue this course.

4. All groundwater usage in the St. Louis Park vicinity should be inventoried, controlled, and monitored.

1982 Cost Estimate ? ? ?

Staff Analysis: The consultant feels strongly that a complete accounting of all the water in the St. Louis Park area should be developed and made available. Additionally, in order to remain flexible with future plans, monitoring of the water contamination problem should continue.

Ultimate Solutions

5. The State of Minnesota should define criteria for polynuclear aromatic hydrocarbons (PAH) in potable water and ambient ground and surface water. The adopted criteria will have statewide impacts, including in particular storm run-off and cooling water discharges into Minnehaha Creek.

1982 Cost Estimate ? ? ?

Staff Analysis: There are at present no official standards on either the state or federal level for PAH compounds in ambient waters or municipal water supplies. Minnesota is one of the few states in the nation that has studied the PAH compounds to the degree detailed in the Hickok report. Any standard that is adopted within Minnesota would have equal applicability on the St. Louis Park drinking water system and all other city drinking water systems in Minnesota.

Additionally, the City was granted a Natural Point Discharge of Effluent Source (NPDES) permit in 1975 to dump the central City storm sewer system into Minnehaha Creek. This system includes the Oak Park Village land and surrounding neighborhoods. Based on the standards suggested in the Hickok report, the storm water would have to be treated prior to release into the Creek.

Since the State of Minnesota is considering spending several million dollars on the mitigation of the Creosote contamination problem, a basic "first step" is to establish legal standards. Prior to the establishment of standards, further work must be done on reviewing the health risks of PAH compounds. Current studies are not only contradictory but very limited. It may be that the natural levels of PAH compounds in the environment preclude standards that are as low as those suggested in the Hickok report.

6. A gradient control well system should be implemented in order to protect downgradient groundwater.

1982 Cost Estimate CAPITAL INVESTMENT: $4,639,000 to $5,731,800

Annual Operation and Maintenance Expenses: $479,500 to $1,726,600

Staff Analysis: The consultant expended a majority of its time on the gradient control well system that is explained in the study. It is believed that the gradient control wells will contain the contaminated plume within the St. Louis Park area and over many hundreds of years eventually remove the contaminants. Without the system, the consultants fear that other cities will lose the availability of potable water from the ground. The plan that is presented in the report and its associated cost estimates seem conservative considering that the contamination was evidently contained when the now contaminated City wells were in full operation prior to 1978. Not until 1980 and 1981 were Well Nos. 4 and 5 closed and the plume found to be moving. Flexibility in the gradient control well system was insisted upon by the consultant as a means of reacting to the changing groundwater conditions. Consequently, an incremental approach to containing the contamination would seem to be a logical beginning step rather than a complete implementation of a costly gradient control well system. Operating the closed City wells and a contaminants monitoring program might very well contain the plume. Other wells to pump out the fluid mass could be operationalized as needed.

7. A pump-out well for wells found to be contaminated should be constructed in the middle drift "source" fluid zone at the south end of the site when appropriate means of disposal are available.

Cost Estimate for 1982 ? ? ?

Staff Analysis: It seems logical that the "source" fluids should be removed from the high contamination location. However, this issue has been disputed between members of the scientific community informed about the St. Louis Park groundwater contamination problem. Some scientists maintain that it is evident that the entire area of "source" fluids and soils needs further study before any recommendation is adopted for implementation with respect to this component of the problem.

8. The data deficiencies should be investigated whether the gradient control well system is implemented or not.

Cost Estimate for 1982 ? ? ?

Staff Analysis: It would be advantageous to have time and money to study the problem further. However, a complete solution to the problem is probably not going to be available for many years. Therefore, it would appear that a priority analysis must occur whereby incremental approaches to solving the problem can be implemented. This would include further studies to provide additional information to remedy the contamination problem.

9. After determination of the extent and nature of "source" peat deposits, excavation of the peat and removal of the associated fluids should be re-evaluated. New data on PAH sorption in the glacial drift should also be taken into account when available.

Cost Estimate for 1982 $12,000,000 to $56,000,000

Staff Analysis: Staff feels additional study is definitely needed in this area as commented on under recommendation 7. Additionally, a cost/benefit analysis should be done go determine whether removal is more advantageous than containment of the "source" materials.

10. One unit of government should have overall responsibility for managing the groundwater in the St. Louis Park vicinity with successful operation of the gradient control well system as its primary function.

Cost Estimate for 1982 ? ? ?

Staff Analysis: The responsibility of the management of the groundwater problem and the associated operational aspects is a key issue that must be addressed. The operational costs, given the time frame of hundreds of years of operation, will be far in excess of the capital investment costs for the mitigation of the contamination problem. One unit of government, presumably the City, will have to manage the operation, but several units of government, including the State, may have to participate in the costs.

CONCLUSION

This report has presented a summary and analysis of A.E. Hickok and Associates' report on groundwater contamination in the City of St. Louis Park. This summary report has been submitted to the City Council for its review. A report on specific strategies and recommendations to address issues discussed in the Hickok Report is currently being prepared by staff. This report will be submitted to the City Council at its January 4, 1982 meeting.

A copy of the Hickok Report is available for review in the City Manager's Office.

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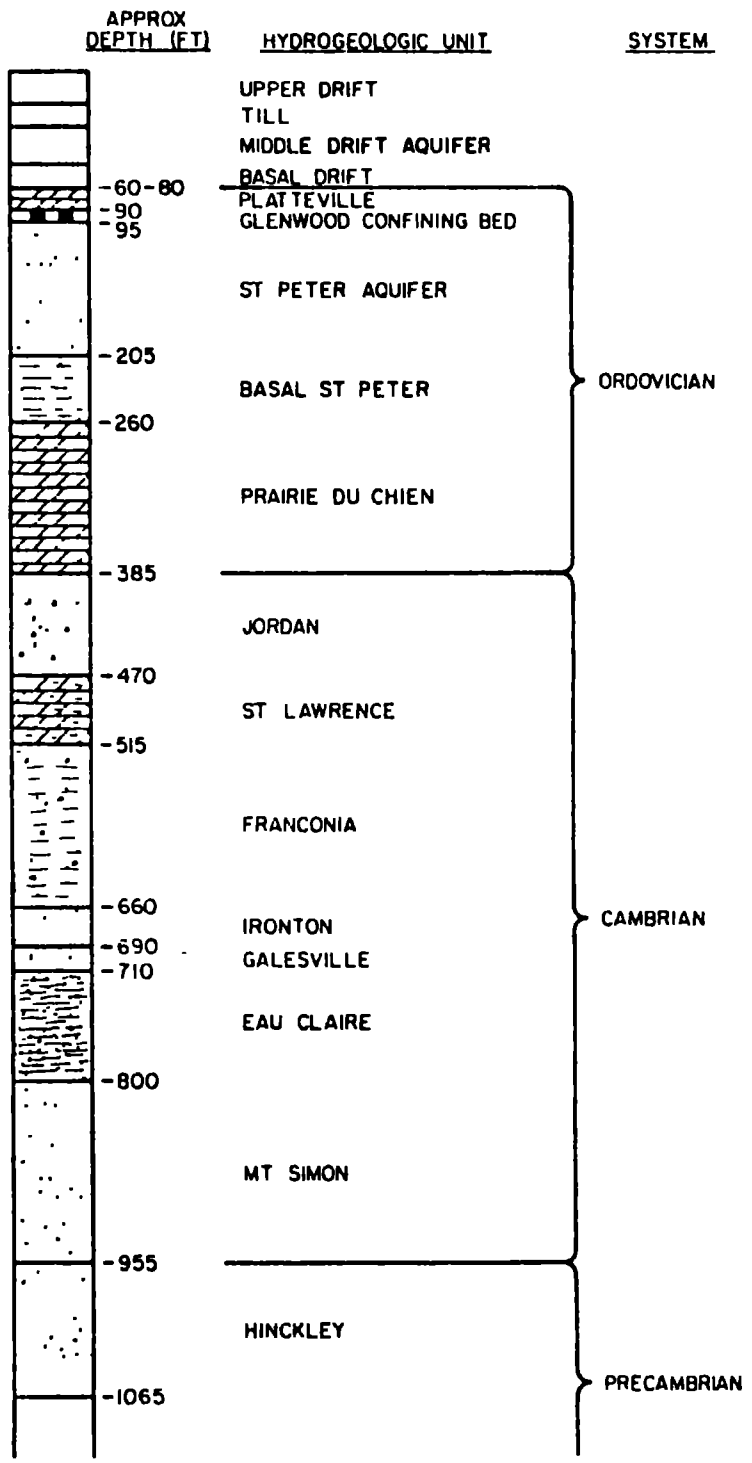
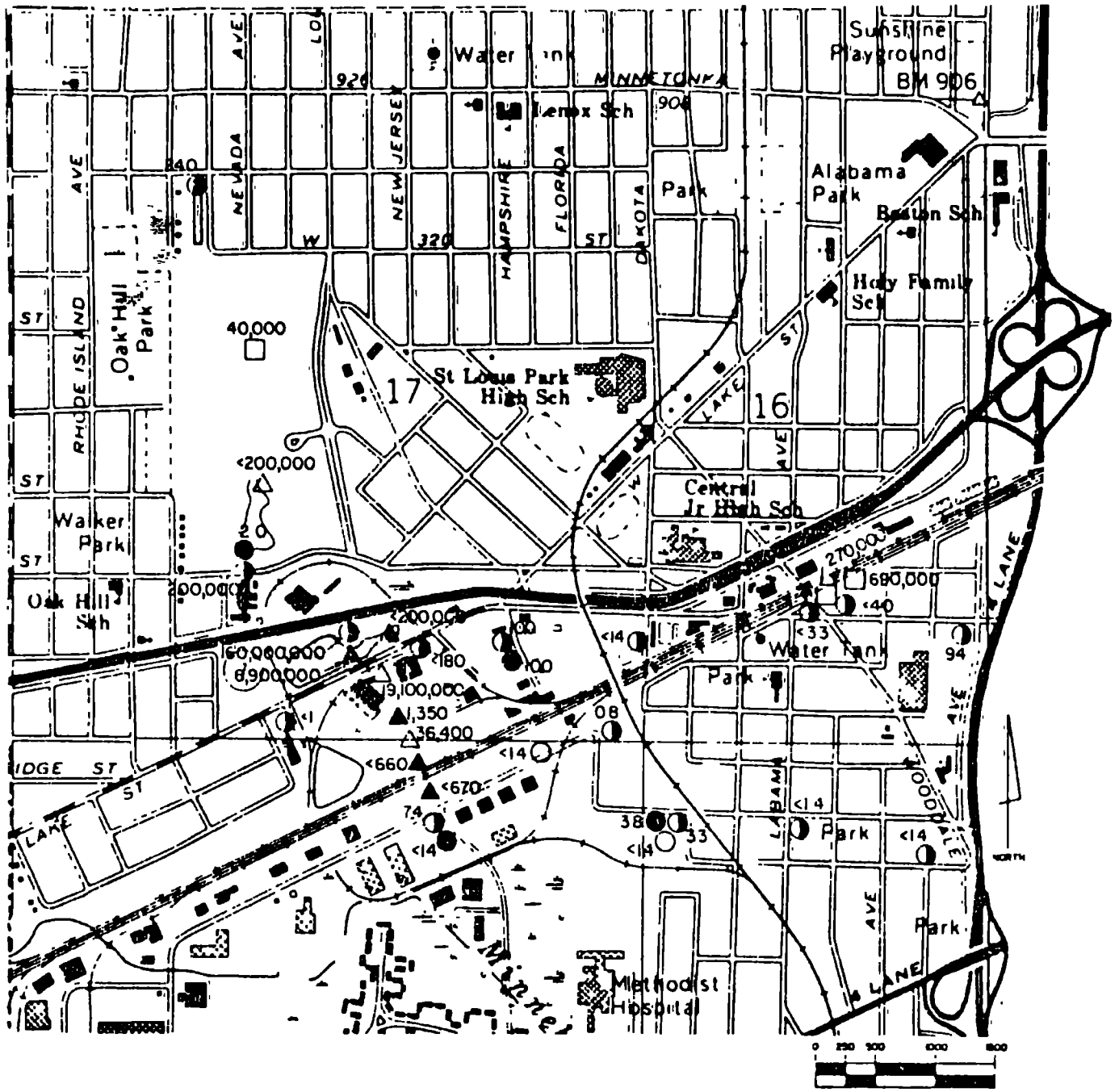
attachment

FIGURE 1



MINN. DEPT. OF HEALTH	E.A. HICKOK & ASSOCIATES	NOV 1981
GENERALIZED STRATIGRAPHIC SEQUENCE IN ST. LOUIS PARK AREA	HYDROLOGISTS-ENGINEERS MINNEAPOLIS-MINNESOTA	2



EXPLANATION

SOIL BORINGS:

- □ UNSATURATED
- △ SATURATED, DEPTH < 20FT.
- ▲ SATURATED, DEPTH > 20FT.

MONITORED WELLS:

- ○ WATER TABLE
- ◑ MIDDLE DRIFT
- ● BASAL DRIFT

NOTE:
NUMBERS ARE BENZO(a)PYRENE CONCENTRATIONS IN ng/kg (SOIL) OR ng/l (WELL)
SHOWN ARE MOST RECENT DATA AS OF AUGUST 1981

▨ SUSPECTED "SOURCE" PEAT ZONE

(FIGURE 2)

MINN. DEPT OF HEALTH	E.A. HICKOK & ASSOCIATES	NOV 1981
SOIL CONTAMINATION IN VICINITY OF FORMER REPUBLIC CREOSOTING SITE	HYDROLOGISTS-ENGINEERS MINNEAPOLIS-MINNESOTA	13